

## CONVERTIBLE

### CROSS-REFERENCE TO RELATED APPLICATION(S)

This application is a U.S. National Phase of International Application No. PCT/DE 2004/002626, filed November 26, 2004, which claims priority to German 103 57 098.5, filed December 6, 2003. The entire contents of the above identified applications are incorporated herein by reference.

### TECHNICAL FIELD

**[0001]** The invention relates to a convertible vehicle with a movable roof according to the main concept of Claim 1, as well as a fastening device with several connection flanges according to the main concept of Claim 7.

### BACKGROUND OF THE INVENTION

**[0002]** It is known to arrange a holding device that has a pump to generate pressure, a control device, and a connection element for connection of hydraulic lines that, in turn, control the hydraulic cylinder as drive units for roof movement, in a convertible vehicle with a hydraulically movable roof.

**[0003]** Since in many cases the roof in the closed state is held on a cover part on the auto-body side with its rear area, which must be opened to retract the roof, an additional assembly expense is produced for the drive devices that are to permit this movement. Assembly is therefore complicated overall and must be done in several steps.

**[0004]** DE 100 52 001 A1 shows a top-compartment cover, movable over an auxiliary frame, in which a drive element responsible for its movement engages on the auxiliary frame. The roof-movement mechanism is completely separated from the movement mechanism of the top-compartment cover.

**[0005]** DE 38 26 789 C2 concerns a control system that adjusts the movement of the roof and the top- compartment cover to each other. Assignment of end switches to different components is mentioned, assignment of additional drive or control parts is not.

#### SUMMARY OF THE INVENTION

**[0006]** The problem underlying the invention is to simplify the assembly of convertible vehicles of the type mentioned.

**[0007]** The invention solves this problem by a convertible vehicle with the features of Claim 1 and by an attachment device with the features of Claim 7. Claims 2 through 6 are referred to for additional advantageous embodiments of the invention.

**[0008]** According to the invention, one or more drive elements for moving the cover part need not be mounted separately on the body, but can be attached to the holding device that also carries elements for moving the roof. This attachment device can therefore be completely equipped before being assembled on the body and inserted as a module, which reduces the assembly expense on the vehicle. The drive element(s) mounted on the holding device for the cover part then need(s) only still be fastened to it with its/their corresponding free end.

**[0009]** Although the holding device can not only be pre-installed outside of the body, which is an advantage, but can also be filled with hydraulic fluid and be checked for function of both the drive element(s) for the cover part and the drive units for moving the roof, an additional simplification of the production process and shifting of the work steps from final assembly to up-line module production are achieved.

**[0010]** A particularly space-saving arrangement is offered when the holding device can be mounted in a side receptacle of the body in front of or behind a wheel well.

**[0011]** In particular, minimization of the number of required parts is achieved[[,]] when the cover part is advantageously movable by a single drive element actuator, which is made possible in conjunction with by using a cover part made of a lightweight material, for example, plastic or

metal foam, and is achieved for the first time with ~~the~~ this invention ~~even-with~~ also using an eccentric drive element.

**[0012]** Additional advantages and features of the invention can be seen from a practical example of the object of the invention, described below and shown at least schematically in the drawing.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawing:

**[0013]** Fig. 1 shows a vehicle according to the invention in a perspective view obliquely from the rear with a completely closed roof,

**[0014]** Fig. 2 shows a similar view to Fig. 1, but without the roof cover being shown and therefore with the body shown as transparent, revealing the holding device mounted on the body and the drive parts of the roof and the cover part,

**[0015]** Fig. 3 shows a similar view to Fig. 2, but before assembly of the module containing the holding device and therefore without a surrounding vehicle body,

**[0016]** Fig. 4 shows the holding device drawn in Figs. 2 and 3 before assembly, but already in the equipped state in an individual part view,

**[0017]** Fig. 5 shows the holding device according to Fig. 4 in the still unequipped state.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0018]** A two-seat vehicle 1 is generally shown in the drawing figures. However, the invention is just as applicable to a four- or five-seat convertible vehicle provided with rear seats.

**[0019]** The vehicle 1 includes in its upper area a roof 3, movable by drive units 4, directly or indirectly adjacent to a windshield frame 2, which can include, at least in areas, a flexible roof

cover 5 and/or several rigid plate parts (not shown). The roof configuration can be designed as required.

**[0020]** In the ~~practical example~~ pictured embodiment, the roof 3 includes ~~in its~~ near the rear end (or edge) area a ~~clip~~ tensioning bow 6, with which it lies on top of a moveable cover part 7 of the body.

**[0021]** However, it is not essential ~~that~~ for the tensioning bow 6 of the roof 3 to lie on the cover part (tonneau cover) 7, but ~~it~~ the cover part 7 can also lie behind ~~a rear roof closure (adjacent to) the rear edge of the roof 3~~. In ~~each~~ either case, the cover part 7 must be moved to allow opening and close closing of the roof 3. ~~At~~ For moving the cover part 7, at least one drive element 8, here a hydraulic cylinder, is provided ~~for moving the cover part~~.

**[0022]** In the practical example, the cover part 7 is made of a lightweight material. Its deployment and retraction movements are caused by a single drive element 8. This is also assigned to only one transverse side of the cover part 7, i.e., well outside of the center.

**[0023]** The drive element 8 is attached on one end to a holding (or fastening) device, designated overall by 9 and shown in Fig. 5 as a single part. Because of the arrangement of drive element 8 on only one side, it is possible to arrange the holding device 9 in an auto-body receptacle on the side in front of or behind a wheel well 10 in a space-saving fashion (Fig. 2).

**[0024]** The holding device 9 can be formed in one piece from a plate that has been beveled several times. It has a first connection flange 11 to hold a control unit 12, a second connection flange 13 to hold hydraulic connections 14 for the control line, and a third connection flange 15 to hold a hydraulic pump 16. In addition, in the lower area, a connection flange 17 to mount the drive element 8 for the cover part 7 is provided, which, in the installed state, passes through a passage opening 18 of fastening device 9 and, in so doing, can point upward (Fig. 4). The free end 19 of the drive element ~~48~~ 8 is therefore situated, when the fastening device 9 is installed, in a position in which it can be connected to the cover part 7. The passage opening 18 can include a support capability 20, here an edge, for the drive element 8, so that this cannot pivot away

downward, despite the pivotable arrangement on fastening device 9, and the free end points upward in a manner suitable for assembly.

**[0025]** The holding device can be fully equipped outside the auto body (Fig. 4), and it can also be connected to the roof 3 by control lines 21, so that even before assembly, the unit shown in Fig. 3 can be checked for function, both in terms of the drive element 8 and the roof movement, after the control lines 21 are filled with hydraulic fluid.

**[0026]** The unit shown in Fig. 3 can then be sent as a complete module for assembly of the auto body, so that the installed position shown in Fig. 2 is produced – in which reference 5 is not shown, merely for clarity.

**[0027]** In the practical example shown here, a single holding device 9 of the type mentioned is sufficient, so that additional weight and space requirements are both minimized.

**[0028]** While the best modes for carrying out the invention have been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention within the scope of the appended claims.

## CLAIMS:

1. A convertible vehicle (1) with a movable roof (3) and at least one movable cover part (7) that in its closed position, covers a receiving area for the opened roof (3) situated in the auto body, and which can be moved up by at least one drive element (8),

**characterized in** that the at least one drive element (8) is arranged on a ~~fastening~~  
5 holding device (9) that can be mounted on the auto body, which is also a support for at least one control unit (12), a hydraulic pump (16) and connections (14) of control lines (21) leading to the drive units (4) for roof movement.

2. A convertible vehicle (1) according to Claim 1,  
**characterized in that** the holding device (9) can be preinstalled outside of the auto body and checked for function of both the drive element(s) (8) for the cover part (7) and the drive units (4) for moving the roof.

3. A convertible vehicle (1) according to ~~one of the Claims 1 or 2~~ Claim 1,  
**characterized in that** the holding device (9) can be installed in a side receptacle of the auto body in front of or behind a wheel well (10).

4. A convertible vehicle (1) according to ~~one of the Claims 1 through 3~~  
Claim 1,  
**characterized in that** the holding device (9) includes a one-piece, multiply beveled plate provided with holes and connection flanges (11, 13, 15, 17).

5. A convertible vehicle (1) according to ~~one of the Claims 1 through 4~~  
Claim 1,  
**characterized in that** the cover part (7) can be moved by a single drive element (8).

6. A convertible vehicle (1) according to ~~one of the Claims 1 through 5~~  
Claim 1,  
**characterized in that** the drive element (8) passes through a passage opening  
(18) of the holding device (9).

7. A multifunctional holding device (9) with several connection flanges (11,  
13, 15, 17) to accommodate at least one control unit (12), a pump (16), and connections (16) for  
emerging hydraulic lines (21),  
**characterized in that** it is designed as a support for at least one drive element (8)  
for a cover part (7) of a compartment top of a convertible vehicle (1).

CONVERTIBLEABSTRACT OF THE DISCLOSURE

A convertible vehicle with a movable roof and at least one movable cover part that in its closed position, covers a receiving area for the opened roof situated in the auto body and which can be moved up by at least one drive element is provided. The at least one drive element is arranged on a fastening device that can be mounted on the auto body which is also a support for at least one control unit, a hydraulic pump and connections of control lines leading to the drive units for roof movement. A multifunctional holding or fastening device with several connection flanges to accommodate at least one control unit, a pump, and connections for emerging hydraulic lines is also provided. The multifunctional holding device is designed as a support for at least one drive element for a cover part of a compartment top of a convertible vehicle.